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**(54) Cleaning and freshening unit intended for suspension from a rim of a toilet bowl**

(57) A cleaning and freshening unit (1) provided with a holder (2) and a liquid reservoir (4) detachably connected to the holder (2), the unit being provided with means (5) for suspension from a rim of a toilet bowl, the unit (1) also being provided with a porous, liquid-absorbing mass (6) which always communicates with liquid (F) contained in the liquid reservoir (4), the holder (2) being provided with a connecting nipple (7) suitable for connection to a discharge opening (8) of the bottle (3), the discharge opening (8) of the bottle (3) when connected being partly closed by a closing wall (9) provided with at least one liquid passage opening (10) which opens into an inlet (11<sup>a</sup>) of a channel (11) abutting with an outlet (11<sup>b</sup>) having a limited surface against the porous mass (6), and provided with at least one air supply opening (12) communicating with the ambient pressure, the sizes of the liquid passage opening (10) and the air supply opening (12) being such that the liquid pressure on the porous mass (6) is always equal and independent of the liquid level in the liquid reservoir (4).

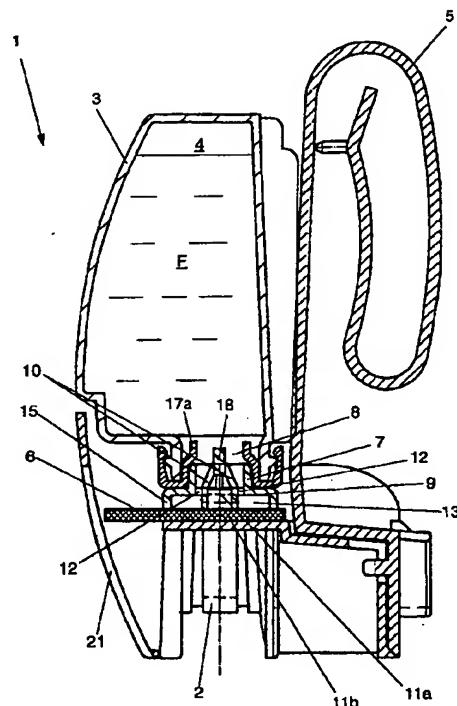


FIG. 2

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## Description

The invention relates to a cleaning and freshening unit according to the preamble of claim 1.

Such a unit is known from European patent application EP-A-0 538 957. A drawback of the known cleaning and freshening unit is that as the liquid level in the liquid reservoir falls it dispenses less liquid to the porous mass per unit of time. As a result thereof, the freshening action of the unit will decrease as the liquid level in the bottle falls.

Another drawback of the known device is that the bottle communicates with the ambient air only via the porous mass. Therefore, the ambient air can only flow into the bottle with difficulty, so that there is a risk of reduced pressure being formed in the bottle which substantially limits the draining of the bottle. This effect, too, leads to a reduced release of liquid per unit of time as the liquid level in the bottle falls.

The object of the invention is to provide a cleaning and freshening unit of the type mentioned in the opening paragraph which does not have the above-mentioned drawbacks.

To this end, the cleaning and freshening unit is characterized by the steps defined in the characterizing part of claim 1.

As a result of the suitably selected sizes of the at least one liquid passage opening and the at least one air supply opening it is achieved that the liquid pressure on the porous mass is always substantially equal and independent of the liquid level in the liquid reservoir. In general, the liquid passage openings will have larger sizes than the air supply openings. The air supply openings must be so small that as a result of the viscosity and the surface tension of the liquid therethrough, at least under normal conditions, no liquid discharges.

The liquid pressure on the porous mass always being substantially equal and independent of the liquid level in the liquid reservoir, a constant saturation of the porous material will be effected during the whole service life of the bottle. Consequently, the drawbacks of the known unit have been removed with the cleaning and freshening unit according to the invention.

As a result of temperature fluctuations the pressure in the liquid reservoir can rise above the atmospheric pressure. Thus, there is the possibility of liquid being forced outwards and flowing away via the air supply openings. Once this effect has occurred, the flow can be maintained under certain conditions as a result of capillary action. This may lead to draining of the bottle within a short time.

In order to prevent this effect, the cleaning and freshening unit is characterized according to a further elaboration by the steps of claim 2. The chamber must of course be of such construction that liquid flowing in the chamber is not drawn away by capillary action, at least can only via the porous mass leave the chamber or be drawn back into the bottle.

According to a further elaboration on the invention

the cleaning and freshening unit is characterized by the steps of claim 3.

The volume of the chamber being so large that the volume variations occurring as a result of temperature fluctuations of air contained in the liquid reservoir can be taken up herein, it is achieved that liquid will never flow out of the chamber via the ventilation openings.

Further elaborations on the invention are described in the subclaims and will be explained in more detail by means of two examples of embodiment, with reference to the accompanying drawings in which

Fig. 1 is a cross-sectional view of an example of embodiment of a cleaning and freshening unit taken along the line I-I of Fig. 2;

Fig. 2 is a cross-sectional view taken along the line II-II of Fig. 1;

Fig. 3 shows the separate bottle forming part of the cleaning and freshening unit in closed condition; and

Fig. 4 shows a cleaning and freshening unit having a chamber provided with a bottom.

The cleaning and freshening unit 1 shown is provided with a holder 2 and a bottle 3 detachably connected to the holder 2 and comprising a liquid reservoir 4. The unit 1 is provided with suspension means 5 for suspending the unit 1 from a rim of a toilet bowl not shown. The unit is also provided with a porous liquid-absorbing mass 6 which always communicates with liquid F contained in the liquid reservoir 4. The porous mass 6 is arranged in the holder 2 so as to be located in a path of the flushing water when the unit 1 is suspended from the rim of the toilet bowl. The porous mass 6 may be, e.g., a sponge or a plate of sintered porous material.

The holder 2 is provided with a connecting nipple 7 suitable for connection to a discharge opening 8 of the bottle 3, so that when the unit 1 is suspended from the rim of the toilet bowl the discharge opening 8 is directed downwards. Of course, the bottle 3 is of such construction that the discharge opening 8 is located at the lowermost point of the bottle 3, so that all liquid F can flow from the liquid reservoir 4 outwards via the discharge opening 8.

According to the invention the discharge opening 8 of the bottle 3 when connected to the connecting nipple 7 is partly closed by a closing wall 9 provided with at least one liquid passage opening 10 which opens into an inlet 11a of a channel 11 abutting with an outlet 11b having a limited surface against the porous mass 6, and provided with at least one air supply opening communicating with the ambient pressure. The sizes of the at least one liquid passage opening 10 and the at least one air supply opening are so adjusted to each other and to the viscosity of the liquid F contained in the liquid reservoir 4 that the liquid pressure on the porous mass 6 is always substantially equal and independent of the liquid level in the liquid reservoir 4.

In the present example of embodiment the air supply openings 12 communicate with the ambient pressure via a chamber 13 provided on the side facing upwards with at least one ventilating opening 14. Preferably, the volume of the chamber 13 is such that it can take up at least the volume variations occurring as a result of temperature fluctuations in air contained in the liquid reservoir 4. Thus, liquid is prevented from flowing outwards and being lost owing to a rise in the pressure in the liquid reservoir 4. Moreover, the liquid reservoir 4 is prevented from continuing to drain as a result of capillary action, so that the liquid reservoir 4 would be empty within a short time. The ventilation openings 14 are preferably located at a higher level than the air supply openings 12. When the air pressure in the liquid reservoir 4 falls, a portion of the liquid contained in the chamber 13 is drawn back again into the liquid reservoir 4. This drawing back will continue until the liquid level in the chamber has fallen so much that there is again a direct air communication between the ventilation opening 14 and the air supply openings 12.

As clearly shown in Figs. 1 and 2, the holder 2 is made of a first moulded piece of which the suspension means 5 form part as well. In Figs. 1 and 2 it is moreover clearly visible that the connecting nipple 7, the closing wall 9, the at least one liquid passage opening 10, the at least one air supply opening 12, the channel 11, and the walls 15 bounding the chamber 13 form part of a second moulded piece detachably connected to the first moulded piece via a snap connection 16. The porous mass 6 is fixed between the first moulded piece and the second moulded piece. In the present example of embodiment the porous mass is a plate-shaped element of sintered material.

As is clearly shown in Fig. 3, the discharge opening 8 of the bottle 3 is closed by a closing cap 17 provided with a first cap portion 17a and a second cap portion 17b. The second cap portion 17b is of such construction that when the bottle is placed on the holder 2 this second cap portion is pressed by a projection 18 provided on the holder 2 into the liquid reservoir 4, so that the bottle 3 is opened and the discharge opening 8 is formed. Thus, it is achieved that when the bottle 3 is placed in the holder 2 the bottle is opened simultaneously. The second cap portion 17b preferably has a specific mass smaller than that of the liquid F, so that it begins to float. It is self-evident that the bottle 3 with the liquid F contained therein will be separately available. The bottle 3 and the holder 2 are provided with projections 19 and grooves 20 which cooperate with each other in a manner such that the bottle 3 can be snapped on the holder 2. Moreover, the holder 2 is provided with a number of slots 21 which increase the access of flushing water to the porous mass 6 and, moreover, give the ambient air free passage to the porous mass 6, which enhances the evaporation of the volatile substances in the liquid and the spreading of the substances. In a flushing operation a portion of the active liquid F contained in the porous mass 6 will enter the flushing water and performing its

cleaning action therein, while after the flushing operation a portion of the active substance evaporates from the porous mass 6 and effects the freshening action on the surroundings.

It is clear that the invention is not limited to the example of embodiment shown but that various modifications are possible within the scope of the invention. Thus, for instance, the shape of the holder may be different and may, as shown in Fig. 4, be provided with a bottom 22, which further reduces the risk of flowing away of the liquid F. Moreover, it is possible that the bottle 3 is provided with another type of cap which must be removed before placing the bottle 3 in the holder 2.

## 15 Claims

1. A cleaning and freshening unit (1) provided with a holder (2) and a bottle (3) detachably connected to the holder (2) and comprising a liquid reservoir (4), said unit (1) being provided with suspension means (5) for suspending the unit (1) from a rim of a toilet bowl, said unit (1) also being provided with a porous, liquid-absorbing mass (6) which always communicates with liquid (F) contained in the liquid reservoir (4), said porous mass (6) being arranged in the holder (2) so as to be located in a path of the flushing water when the unit (1) is suspended from the rim of the toilet bowl, said holder being provided with a connecting nipple (7) suitable for connection to a discharge opening (8) of the bottle (3), so that when the unit (1) is suspended from the rim of the toilet bowl the discharge opening (8) is directed downwards, characterized in that the discharge opening (8) of the bottle (3) when connected is partly closed by a closing wall (9) provided with at least one liquid passage opening (10) which opens into an inlet (11a) of a channel (11) abutting with an outlet (11b) having a limited surface against the porous mass (6), and provided with at least one air supply opening (12) communicating with the ambient pressure, the sizes of the at least one liquid passage opening (10) and the at least one air supply opening (12) being so adjusted to each other and to the viscosity of the liquid (F) contained in the liquid reservoir (4) that the liquid pressure on the porous mass (6) is always substantially equal and independent of the liquid level in the liquid reservoir (4).
2. A cleaning and freshening unit according to claim 1, characterized in that the air supply openings (12) communicate with the ambient pressure via a chamber (13) provided on a side facing upwards with at least one ventilating opening (14).
3. A cleaning and freshening unit according to claim 2, characterized in that the volume of the chamber (13) is such that at least the volume variations occurring as a result of temperature fluctuations in

air contained in the liquid reservoir (4) can be taken up herein.

4. A cleaning and freshening unit according to any of the preceding claims, characterized in that the holder (2) is made of a first moulded piece of which the suspension means (5) form part as well. 5
5. A cleaning and freshening unit according to at least claims 2 and 4, characterized in that the connecting nipple (7), the closing wall (9), the at least one liquid passage opening (10), the at least one air supply opening (12), the channel (11), and the walls (15) bounding the chamber (13) form part of a second moulded piece detachably connected to the first moulded piece via a snap connection (16). 10
6. A cleaning and freshening unit according to claim 5, characterized in that the porous mass (6) is fixed between the first and the second moulded piece. 20
7. A cleaning and freshening unit according to any of the preceding claims, characterized in that the discharge opening (8) of the bottle (3) is closed by a closing cap (17) provided with a first cap portion (17a) and a second cap portion (17b), said second cap portion (17b) being of such construction that when the bottle (3) is placed on the holder (2) said second cap portion (17b) is pressed by a projection (18) provided on the holder (2) into the liquid reservoir (4), so that the bottle (3) is opened and the discharge opening (8) is formed. 25 30

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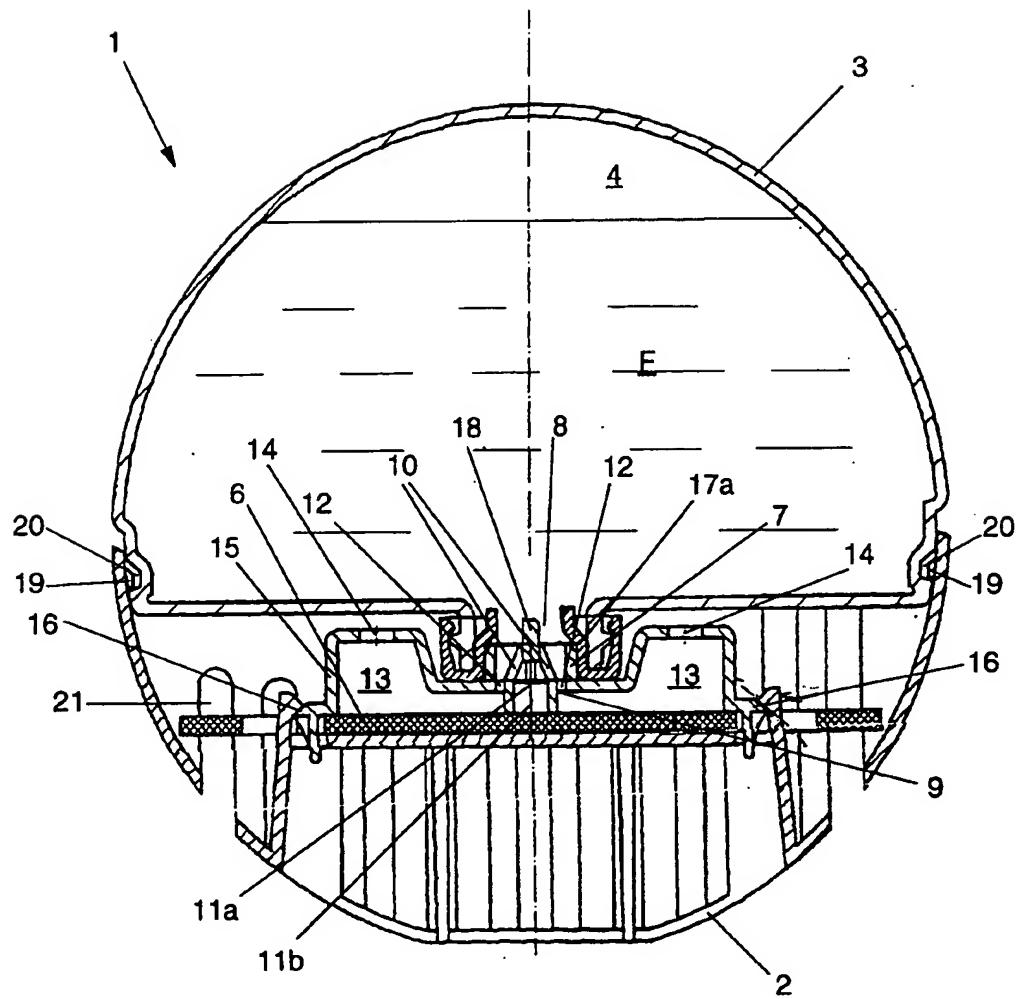


FIG. 1

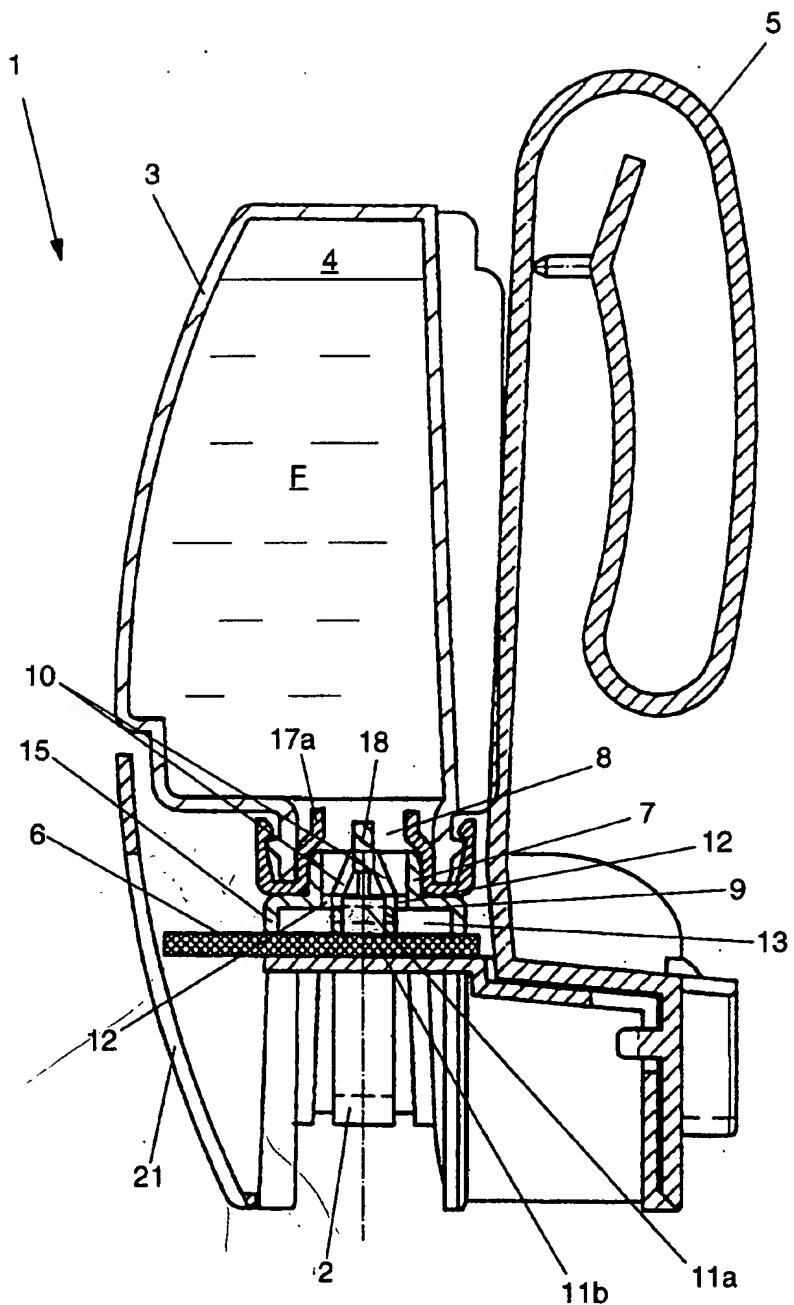
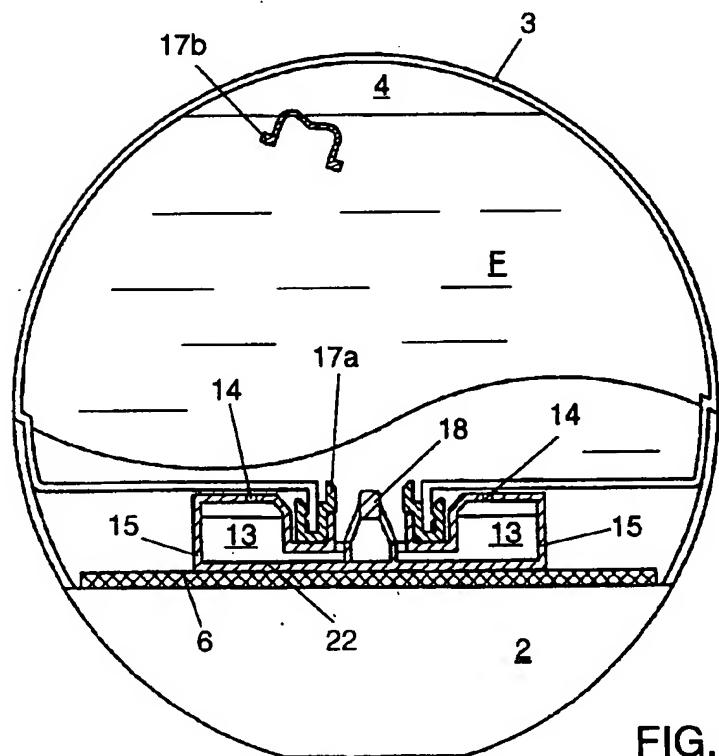
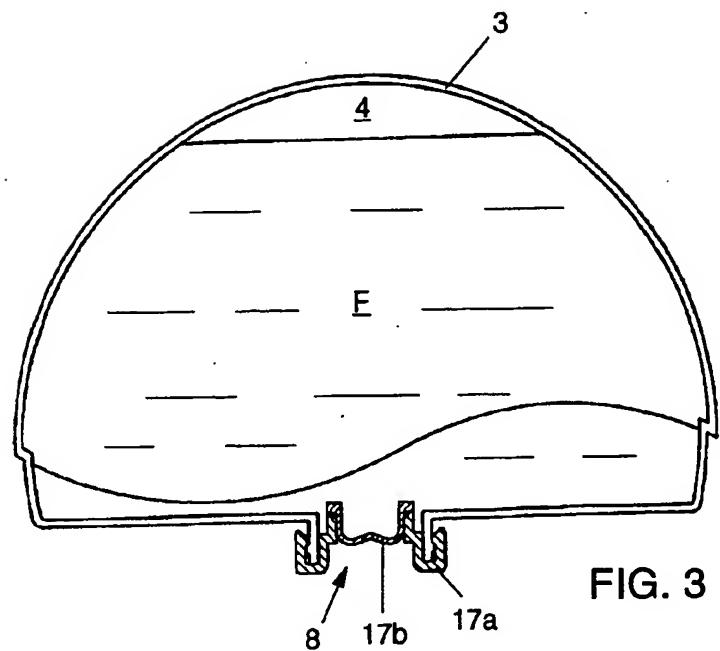


FIG. 2





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## EUROPEAN SEARCH REPORT

Application Number

EP 96 20 3280

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Y,D	EP 0 538 957 A (SARA LEE/DE N.V.) 28 April 1993	1,4,7	E03D9/03
A	* the whole document *	5,6	
Y	US 5 409 135 A (CAMPAU) 25 April 1995	1,4,7	
	* column 3, line 22 - line 33 *		
Y	US 4 916 760 A (SHAHAR) 17 April 1990	7	
A	* figures 3,6 *	1	
A	EP 0 570 326 A (FLOW-RITE CONTROLS LTD) 18 November 1993	1	
	* column 1, line 6 - line 14 *		
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The present search report has been drawn up for all claims			
Place of search  THE HAGUE	Date of completion of the search  10 February 1997	Examiner  Van Beurden, J	
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
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